CLAIMS

What is claimed is:

1. A method of determining a deadlock-free path between first and second nodes in a network comprising links between a plurality of nodes, the method comprising:

forming an ordered set of deadlock-free sub-topologies of the network, each sub-topology comprising links that are not used in any other sub-topology;

assigning each sub-topology a unique layer identifier, the layer identifier assigned in a sequential order with respect to the order of the set;

assigning each link the layer identifier of the respective sub-topology of which the link is a member; and

selecting a plurality of links from the first node to the second node such that in traversing from a previous link to a next link a value of the layer identifier assigned to the next link is at least as great as a value of the layer identifier assigned to the previous link.

2. A method of determining a path between first and second nodes in a network comprising links between a plurality of nodes, the method comprising:

forming a set of sub-topologies of the network, each sub-topology comprising links that are not used in any other sub-topology;

ordering the set of sub-topologies in a first order;

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assigning each sub-topology a unique layer identifier, the layer identifier corresponding to the first order;

assigning the layer identifier of the respective sub-topology to each link of the respective sub-topology; and

determining the path by selecting a plurality of links from the first node to the second node such that, in traversing from a previous link to a next link along the path, a value of the layer identifier assigned to the next link is at least as great as a value of the layer identifier assigned to the previous link.

3. The method as recited in claim 2, wherein each sub-topology is deadlock-free.

4. The method as recited in claim 2, wherein the first order is different than an order in which the set of sub-topologies is formed.

5. The method as recited in claim 2, wherein at least one of the sub-topologies is a spanning tree.

6. A method of determining a path between first and second nodes in a network comprising links between a plurality of nodes, the method comprising:

forming a set of sub-topologies of the network, each sub-topology comprising links that are not used in any other sub-topology;

ordering the set of sub-topologies in a first order; and

determining the path by selecting a plurality of links from the first node to the second node such that, in traversing from a previous link to a next link along the path, the next link is either in a same sub-topology as the previous link or the next link is in a subsequent sub-topology as a function of the first order of the set.

7. The method as recited in claim 6, further comprising:

assigning each sub-topology a unique layer identifier, the layer identifier corresponding to the first order; and

assigning the layer identifier of the respective sub-topology to each link of the respective sub-topology, wherein determining the path comprises determining that a value of the layer identifier assigned to the next link is at least as great as a value of the layer identifier assigned to the previous link.

8. The method as recited in claim 6, wherein each sub-topology is deadlock-free.

9. The method as recited in claim 6, wherein the first order is different than an order in which the set of sub-topologies is formed.

10. The method as recited in claim 6, wherein at least one of the sub-topologies is a spanning tree.

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11. The method as recited in claim 6, wherein the first order is an order in which the set of sub-topologies is formed.

12. The method as recited in claim 6, wherein each sub-topology comprises two or more links.

13. A method of determining a path in a network comprising links between a plurality of nodes, the method comprising:

forming a set of sub-topologies of the network, each sub-topology comprising links that are not used in any other sub-topology;

ordering the set of sub-topologies in a first order; and

determining the path by selecting a plurality of links such that, in traversing from a previous link to a next link, the next link is either in a same sub-topology as the previous link or the next link is in a subsequent sub-topology as a function of the first order of the set.

14. The method as recited in claim 13, further comprising:

assigning each sub-topology a unique layer identifier, the layer identifier corresponding to the first order; and

assigning the layer identifier of the respective sub-topology to each link of the respective sub-topology, wherein determining the path comprises determining that a value of the layer identifier assigned to the next link

is at least as great as a value of the layer identifier assigned to the previous link.

15. The method as recited in claim 13, wherein each sub-topology is deadlock-free.

16. The method as recited in claim 13, wherein the first order is different than an order in which the set of sub-topologies is formed.

17. The method as recited in claim 13, wherein at least one of the sub-topologies is a spanning tree.

18. The method as recited in claim 13, wherein the first order is an order in which the set of sub-topologies is formed.

19. The method as recited in claim 13, wherein each sub-topology comprises two or more links.

20. The method as recited in claim 13, wherein the first order is circular.

21. A method of determining a path in a network comprising links between a plurality of nodes, the method comprising:

forming a set of sub-topologies of the network, each sub-topology comprising links that are not used in any other sub-topology;

assigning a layer identifier to each sub-topology;

assigning the layer identifier to each link in the respective sub-topology; and

determining the path by selecting a plurality of links as a function of the layer identifier.

22. The method as recited in claim 21, further comprising ordering the layer identifiers in a first order, and wherein determining the path comprises:

traversing from a previous link to a next link, wherein the layer identifier of the next link is either the same as the layer identifier of the previous link or the layer identifier of the next link is subsequent to the layer identifier of the previous link as a function of the first order of the layer identifiers.

23. The method as recited in claim 22, wherein the first order is circular.

24. The method as recited in claim 22, wherein each sub-topology is deadlock-free.

25. The method as recited in claim 22, wherein the first order is different than an order in which the set of sub-topologies is formed.

26. The method as recited in claim 22, wherein at least one of the sub-topologies is a spanning tree.

27. The method as recited in claim 22, wherein the first order is an order in which the set of sub-topologies is formed.

28. The method as recited in claim 22, wherein each sub-topology comprises two or more links.

29. The method as recited in claim 22, wherein the first order is circular.

30. A data forwarding device, comprising:

at least one processor;

a memory communicably coupled to said processor;

routing program code, stored in said memory for execution by said processor, said routing program code for determining at least one path through a network, wherein said network comprises links between a plurality of nodes, said routing program code comprising:

program code for forming a set of sub-topologies of the network, each sub-topology comprising links that are not used in any other sub-topology;

program code for assigning a layer identifier to each sub-topology;

program code for assigning the layer identifier to each link in the respective sub-topology; and

program code for determining the path by selecting a plurality of links as a function of the layer identifier.

31. A computer program product including a computer readable medium, said computer readable medium having a computer program stored thereon, said computer program for determining at least one path through a network, wherein said network comprises links between a plurality of nodes, said computer program comprising:

program code for forming a set of sub-topologies of the network, each sub-topology comprising links that are not used in any other sub-topology;

program code for assigning a layer identifier to each sub-topology;

program code for assigning the layer identifier to each link in the respective sub-topology; and

program code for determining the path by selecting a plurality of links as a function of the layer identifier.

32. A computer data signal embodied in a carrier wave, said computer data signal including a computer program, said computer program for determining at least one path through a network, wherein said network comprises links between a plurality of nodes, said computer program comprising:

program code for forming a set of sub-topologies of the network, each sub-topology comprising links that are not used in any other sub-topology;

program code for assigning a layer identifier to each sub-topology;

program code for assigning the layer identifier to each link in the respective sub-topology; and

program code for determining the path by selecting a plurality of links as a function of the layer identifier.

33. A system for determining at least one path through a network, comprising:

means for forming a set of sub-topologies of the network, each sub-topology comprising links that are not used in any other sub-topology;

means for assigning a layer identifier to each sub-topology;

means for assigning the layer identifier to each link in the respective sub-topology; and

means for determining the path by selecting a plurality of links as a function of the layer identifier.

34. A method for determining at least one path through a network, comprising:

forming an ordered set of at least two layers, wherein each of said layers includes a sub-topology of said network based on unused links with respect to any other layers; and

determining said at least one path through said network, wherein said determining includes selecting a plurality of links of said network, wherein said path traverses said plurality of links, and wherein each of said selected links is associated with one of said layers having a position in said ordered set of layers at least as great as any position of any layer associated with any previously selected link within said path.

35. The method of claim 34, wherein said forming said ordered set of layers further comprises forming each layer such that each of said sub-topologies included within each of said layers is deadlock-free.

36. The method of claim 35, wherein said forming of said ordered set of layers further comprises forming at least one spanning tree as at least one of said sub-topologies.

37. The method of claim 36, wherein said forming of said ordered set of layers further comprises forming at least one set of disconnected trees as at least one of said sub-topologies.

38. The method of claim 35, wherein said forming of said ordered set of layers further comprises forming at least one loop-free path using an up/down routing determination.

39. The method of claim 34, wherein at least one of said links within said network is a virtual channel.

40. The method of claim 34, wherein said determining said path comprises determining a lowest cost path between a first selected node and a second selected node.

41. The method of claim 34, wherein said determining said path comprises determining a shortest path between a first selected node and a second selected node.

42. A data forwarding device, comprising:

at least one processor;

a memory communicably coupled to said processor;

routing program code, stored in said memory for execution by said processor, said routing program code for determining at least one path through a network, said routing program code comprising:

program code for forming an ordered set of at least two layers, wherein each of said layers includes a sub-topology of said network based on unused links with respect to any other layers; and

program code for determining said at least one path through said network, wherein said program code for determining includes program code for selecting a plurality of links of said network, wherein said path traverses said plurality of links, and wherein each of said selected links is associated with one of said layers having a position in said ordered set of layers at least as great as any position of any layer associated with any previously selected link within said path.

43. The data forwarding device of claim 42, wherein said program code for forming said ordered set of layers further comprises program code for forming each layer such that each of said sub-topologies included within each of said layers is deadlock-free.

44. The data forwarding device of claim 43, wherein said program code for forming of said ordered set of layers

further comprises program code for forming at least one spanning tree as at least one of said sub-topologies.

45. The data forwarding device of claim 44, wherein said program code for forming of said ordered set of layers further comprises program code for forming at least one set of disconnected trees as at least one of said sub-topologies.

46. The data forwarding device of claim 43, wherein said program code for forming of said ordered set of layers further comprises program code for forming at least one loop-free path using an up/down routing determination.

47. The data forwarding device of claim 42, wherein at least one of said links within said network is a virtual channel.

48. The data forwarding device of claim 42, wherein said program code for determining said path comprises program code for determining a lowest cost path between a first selected node and a second selected node.

49. The data forwarding device of claim 42, wherein said program code for determining said path comprises program code for determining a shortest path between a first selected node and a second selected node.

50. A computer program product including a computer readable medium, said computer readable medium having a

computer program stored thereon, said computer program for determining at least one path through a network, said computer program comprising:

program code for forming an ordered set of at least two layers, wherein each of said layers includes a sub-topology of said network based on unused links with respect to any previous layers; and

program code for determining said at least one path through said network, wherein said program code for determining includes program code for selecting a plurality of links of said network, wherein said path traverses said plurality of links, and wherein each of said selected links is associated with one of said layers having a position in said ordered set of layers at least as great as any position of any layer associated with any previously selected link within said path.

51. A computer data signal embodied in a carrier wave, said computer data signal including a computer program, said computer program for determining at least one path through a network, said computer program comprising:

program code for forming an ordered set of at least two layers, wherein each of said layers includes a sub-topology of said network based on unused links with respect to any previous layers; and

program code for determining said at least one path through said network, wherein said program code for determining includes program code for selecting a plurality of links of said network, wherein said path traverses said plurality of links, and wherein each of

said selected links is associated with one of said layers having a position in said ordered set of layers at least as great as any position of any layer associated with any previously selected link within said path.

52. A system for determining at least one path through a network, comprising:

means for forming an ordered set of at least two layers, wherein each of said layers includes a sub-topology of said network based on unused links with respect to any previous layers; and

means for determining said at least one path through said network, wherein said determining includes selecting a plurality of links of said network, wherein said path traverses said plurality of links, and wherein each of said selected links is associated with one of said layers having a position in said ordered set of layers at least as great as any position of any layer associated with any previously selected link within said path.

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